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Adjustable-Height Chassis Device for Carrying Medical and Paramedical Furniture

[Dispositif de châssis à hauteur variable notamment destiné à supporter du mobilier médical et paramédical]

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The object of the present invention is an adjustable-height chassis device for carrying medical and paramedical furniture.

In the medical or paramedical field, it is often necessary to change the height of the plane at which patients are lying during caregiving operations being performed on the patient or simply to make him/her more comfortable when resting.

Current adjustable-height beds generally include a bearer or work surface mounted atop a frame via pantographs that are actuated using a nut-and-screw system, for example.

Lifting systems that include jack screws, telescoping columns, or racks are also known.

However, these devices do not support heavy furniture well. Moreover, their design makes them unhygienic and they are not easily adapted to conventional hospital-type furniture. Lastly, they are not easy to maintain.

The document FR-A-2,675,356 describes a work bed whose height is adjustable depending upon the user's needs, and includes, on the one hand, a horizontal frame that defines the lying plane connected to a chassis via uprights composed of telescoping parts, each of which includes three tubes having a square cross section, which are mounted so that they slide over

[1] Numbers in the margin indicate pagination in the foreign text.

each other, and on the other hand, an electric engine that actuates a perpetual screw that is coaxial to the upright and that causes the inner tube to rise, which results, with the help of peripheral stops, in the rising of the median tube when the latter comes into contact with the lower surfaces of said median tube, which in turn drives the outer tube in the same fashion.

However, this device has disadvantages relating to its stability in a high position and is not well-suited to conventional hospital-type furniture.

The goal of the present invention is to eliminate these disadvantages by proposing an adjustable-height chassis device that can be adapted to any horizontal plane that requires vertical mobility, such as beds, bathtubs, or other types of furniture used to meet the needs of the requested department. Moreover, this device offers ease of assembly for its various frame parts and enables quick external disassembly and reassembly, as

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well as easy maintenance of its constitutive parts using any type of maintenance equipment. Lastly, the streamlining and watertightness of all of the mechanical parts making up the chassis of the device of the invention guarantee optimal safety and cleanliness.

The chassis device of the invention is basically characterized by including a frame composed of a chassis made up of a frame formed by two longitudinal tubes and two transverse tubes, onto which are integrated four telescoping feet, each of which is composed of at least two tubes that slide inside each other using at least one perpetual screw that is caused to rotate by a drive gear, whose axis is perpendicular to said frame, driven by a drive chain or belt, circulating inside the four tubes that make up said frame and driven by a drive gear controlled by the user.

In a preferred embodiment of the invention, each telescoping foot is composed of three tubes having a square cross section, with the outer tube being integrated into the frame, which slide into each other via two pull-out screws -- an inner screw and an outer screw - with the inner screw being integrated axially at its upper end to the drive gear that drives it in free rotation inside the outer screw, whose upper end is axially integrated into a metal cage surrounding a nut, able to turn around its axis inside the inner tube, integrated into said cage and inside which the inner screw is housed; said nut includes a rotation drive stop for the outer screw by contact with a stop that protrudes out laterally from the lower end of the inner screw, with the outer screw being housed inside a square-cross-section nut that is integrated into the inner

tube, starting with the frame in the low position, the rotation of the inner screw then drives via translation the median tube and the inner tube together, then the rotation of the outer screw drives the translation of the inner tube.

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The advantages and characteristics of the present invention will be more apparent upon reading the following description and the related attached drawing, with the understanding that this description is in no way limitative in relation to the invention.

In the attached drawing:

- Figure 1a shows a perspective view of the chassis device of the invention in the raised position.
- Figure 1b shows a perspective view of the chassis device of the invention in the lowered position.
- Figure 2 shows a longitudinal cross section view of the frame of the chassis device of the invention.
- Figure 3 shows a longitudinal cross section view of a telescoping foot of the chassis device of the invention with the chassis in the lowered position.
- Figure 4 shows a longitudinal cross section view of the same telescoping foot with the chassis in the raised position.

If we refer to figures 1a and 1b, we can see that the adjustable-height chassis device of the invention includes a frame 1 composed of two longitudinal tubes 10 and two transverse tubes 11 that are welded together; said frame 1 includes four telescoping feet 2, each of which has three metal tubes with a square cross section and that are of equal length; these slide inside each other and are equipped at their lower end with a castor 14.

In Figure 2, we can see that the frame 1 includes a drive chain 3 that is stretched between four gears 4 located at each corner of the frame 1, whose axis 40 is perpendicular to the plane of the frame 1, and whose tension is reinforced by an idler gear 50. The chain 3 is driven by a drive gear 51, which is set in motion by an engine 13 shown in figures 1a and 1b, located between the idler gear 50 and a limit gear 52. The three gears - the idler gear 50, drive gear 51, and limit gear 52 - are installed inside one of the two transverse tubes 11 and the drive chain 3 moves inside housings 30.

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If we now look at Figure 3, we can see that a telescopic foot 2 of the frame 1 of the adjustable-height chassis includes an inner tube 20 and a median tube 21 that slide inside an outer tube 22, integrated into the frame 1 via a buttress 12 locked in place by four nuts 120 that are anchored by two pull-out screws,

one inner 6 and one outer 7. The inner screw 6 is axially connected at its upper end to a gear 4, which is caused to rotate by the drive chain 3, which causes the inner screw 6 to rotate around its axis. The inner screw is housed inside a nut 210, whose diameter is smaller than the inner dimensions of the inner tube 20 so that it can turn inside the latter thanks to a stop 214 by contact with a stop 61 that protrudes out laterally from the lower end of the inner screw 6. The nut 210 is preferably made of a polyamide resin-based material such as nylon and is integrated into the upper end of the median tube 21 and surrounded by a metal cage 211 that is axially integrated into the upper end of the outer screw 7. The nut 210 also includes a shoulder 215 on which a stainless steel flat 212, integrated via welding into the inner wall of the median tube 21, may rest; this flat 212 is taken up between said shoulder and a clip attached to the upper end of the nylon screw 210.

A second nut 200 with a square cross section and whose dimensions are roughly equal to the inner dimensions of the inner tube 20 is integrated into the latter via a rivet 201.

In order to limit stress on the end threadings, on the one hand the inner screw 6 includes a stop 62 that extends out laterally from its upper end and comes to rest against a stop 216, visible behind the stop 62, extending out laterally from the nut 210, and on the other hand the square-cross-section nut

200 is traversed vertically, not far from one of its lateral sides, by an end counterstop 202 of the outer screw 7 that overlaps with each of the upper and lower surfaces of the nut 200. The lower end of the vertical counterstop 202 is intended to stop against a pin 70 that laterally traverses the lower end of the outer screw 7 and a round part 71, whose diameter is slightly smaller than the inner dimensions of the inner part 20,

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integrated into the lower end of the outer screw 7 and the upper end of the vertical counterstop 202 is intended to come into contact with a stop 217 that lies roughly vertically underneath the nut 210.

If we refer to figures 1a, 1b, 3, and 4, we can see that the operation of the chassis of the invention starting from its lowest position, shown in Figure 3, up to a raised position, shown in Figure 4, is as follows: the operator controls the start-up of the engine 13, which drives the drive gear 51, which is visible in Figure 2, and the drive chain 3 driving the gears 4 and the inner screw 6 in the direction indicated by the arrow A, of each telescoping foot 2, the effect of which is to raise the outer tube 22 and therefore the frame 1, that is supporting a medical or paramedical bed, for example. The stop 61 located at the lower end of the inner screw 6 comes to rest against the stop 214 of the 210 that causes the latter to rotate, which

turns the outer screw 7 inside the square-cross-section nut 200 that is integrated into the inner tube 20, causing the assembly of the median tube 21 and the outer tube 22 to rise in relation to the inner tube 20.

The device of the invention guarantees, through the parts that constitute it and their mode of assembly, that the mechanism is thoroughly sealed and that the surrounding environment is safe, since it is at no time in contact with the various moving parts; it also offers a pleasing appearance.

Moreover, the telescoping movement of the various parts of the telescoping feet 2 have the property of expanding to the desired length without any possible end locking during rotation of the two pull-out screws.

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CLAIMS

1. Adjustable-height chassis device, intended to carry medical and paramedical furniture, characterized in that it includes a chassis composed of a frame (1) formed by two longitudinal tubes (10) and two transverse tube (11); under this frame (1) are integrated four telescoping feet (2), each of which is composed of at least two tubes (20, 21, 22) that slide inside each other via at least one perpetual screw (6, 7) that is caused to rotate by a drive gear (4), whose axis (40) is perpendicular to said frame (1), driven

by a drive chain or belt (3), circulating inside the four tubes (10, 11) making up said frame (1), driven by a drive gear (51).

2. Device according to Claim 1, characterized in that each telescoping foot (2) is composed of three square-cross-section tubes (20, 21, 22), with the outer tube (22) being integrated into the frame (1); the tubes slide inside each other via two pull-out screws (6, 7), an inner screw (6), and an outer screw (7), with the inner screw (6) being integrated axially by its upper end to the drive gear (4) which drives it in free rotation inside the outer screw (7) whose upper end is integrated into a metal cage (211) surrounding a nut (210) that is able to turn inside the inner tube (20) and inside which the inner screw (6) is housed; said nut (20) includes a stop (214) that drives the rotation of the outer screw (7) by contact with a stop (61) that extends out laterally from the lower end of the inner screw (6), with the outer screw (7) being housed inside a square-cross-section nut (200) integrated into the inner tube (20).

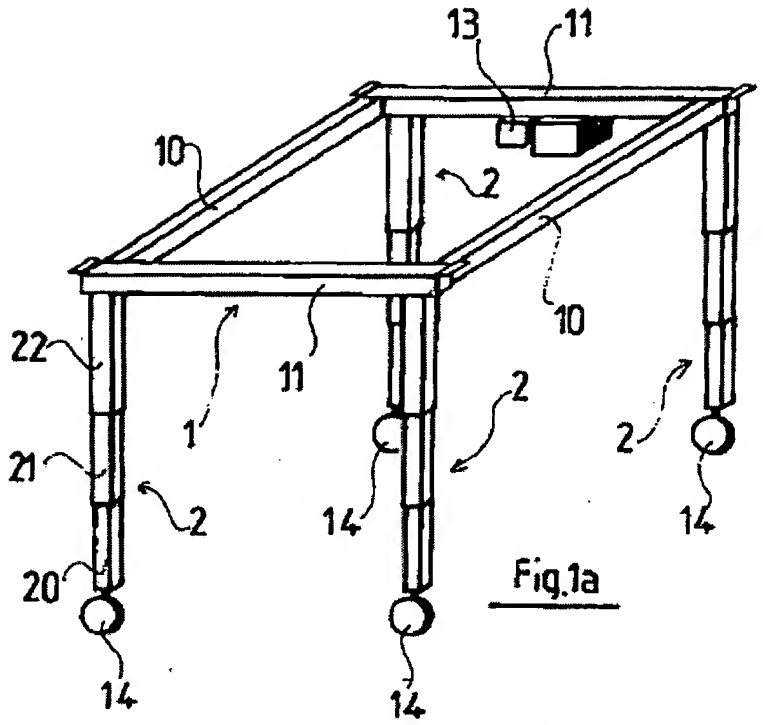

Fig.1a

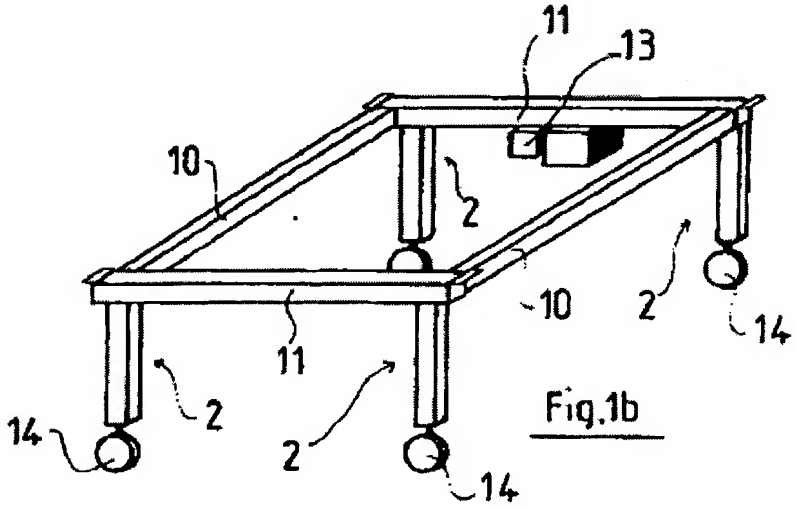

Fig.1b

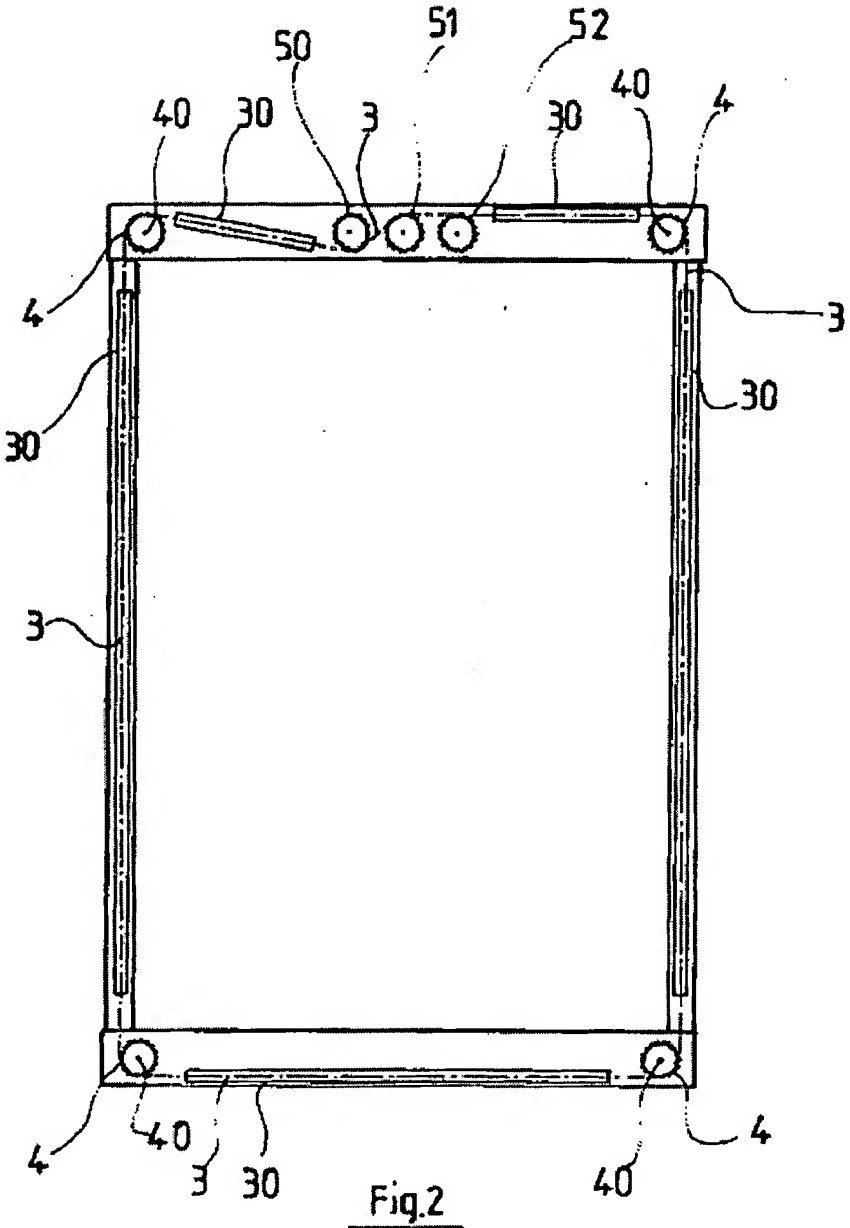

Fig.2

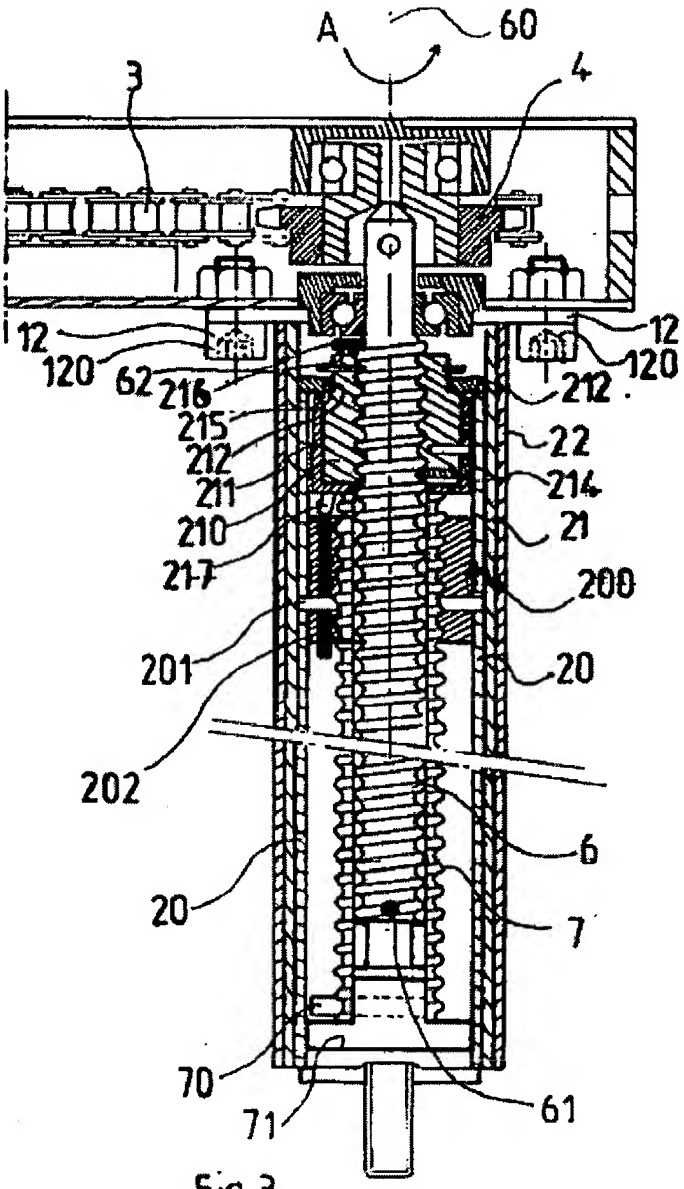
A
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Fig.3

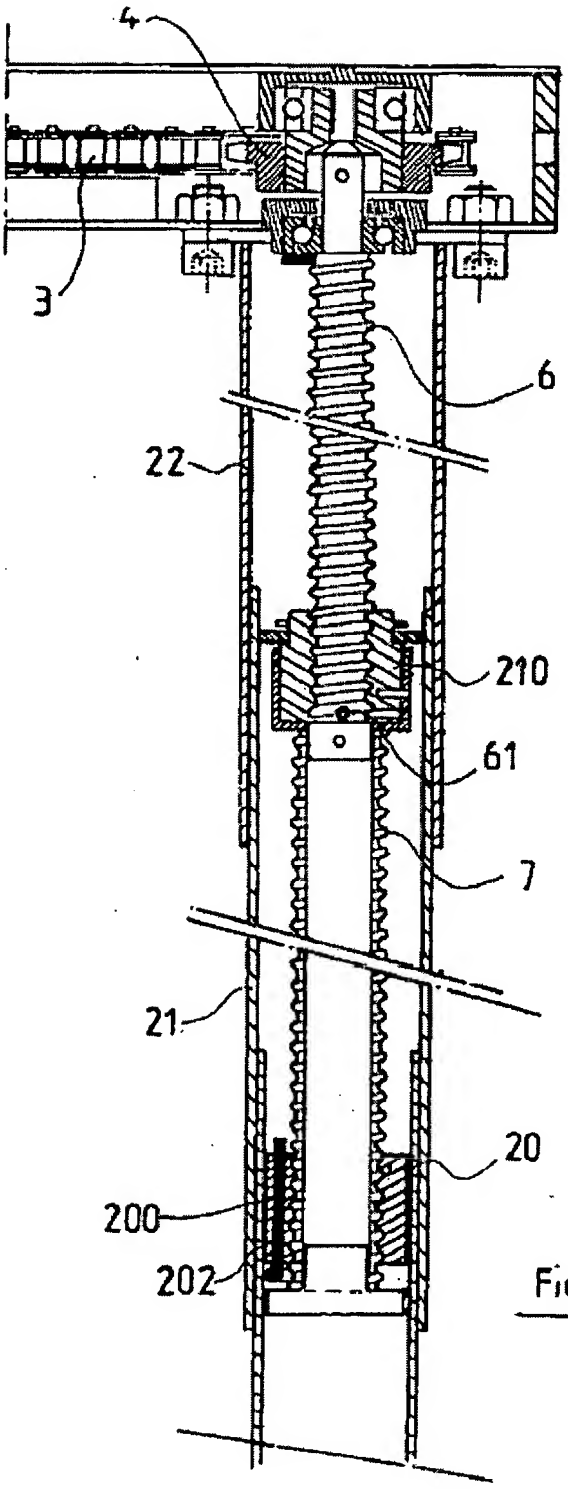

Fig. 4

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PERTINENT DOCUMENTS			
Category	Document citation with indication, if necessary, of pertinent sections	Claim involved in the examined request	
X	US 3,587,482 A (WIELAND) * entire document *	1	
X A	US 5,088,421 A (BECKSTEAD) *entire document *	1 2	
X	US 4,593,874 A (DUNAGAN) *entire document *	1	
			Technical fields searched (Int.Cl.6)
			A47B A61G
Date search completed: February 24, 1997		Examiner: Noesen, R.	

CATEGORY OF THE CITED DOCUMENTS	
X: Especially pertinent on its own Y: Especially pertinent in combination with another document in the same category A: Technological background O: Unwritten disclosure P: Intermediate document	T: Theory or principle on which the invention is based E: Prior patent document, but published on the filing date or after this date D: Cited in the application L: Cited for other reasons A: Member of the same family, corresponding document